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DIVISION OF MYCOLOGY AND DISEASE SURVEY

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MEMORANDUM FOR COLLABORATORS

One of the subjects of interest discussed at the Plant Disease Survey Conference at St. Louis centered about methods of obtaining Survey records, particularly the use of selected observation stations for that purpose. Attention was directed to plans being matured by the workers on tobacco diseases for an annual coordinated survey, the results of which are intended to be comparable from State to State and from year to year. At the Conference on Coordination of Tobacco Disease Research held at Greensboro, North Carolina, November 6 and 7, 1935, the need was frequently emphasized of more adequate information regarding the annual incidence and the relative local severity as well as the geographical distribution of the various tobacco diseases. It was felt that records of diseases obtained systematically and periodically at well-chosen strategic localities for a period of years and correlated with environmental factors such as fluctuation in temperature, relative humidity and precipitation; soil temperature, reaction, and texture; or other pertinent data of similar character would have cumulative research value, and that they should be so obtained and recorded as to be comparable season with season and station with station.

The Tobacco Conference provided for the organization of committees, one for each of the major diseases, composed of the workers engaged in research on the particular disease in question. The committees in each case will agree upon specific data to be obtained in a uniform manner at each of the various observation points established. Of course, the recording of this specific data will not preclude complete freedom in recording additional observations of potential interest or value.

Within each of the cooperating States, observation points will be selected by the State workers so chosen within typical tobacco areas that they can be visited several times each year at appropriate periods for record making purposes. Branch stations, where phenological records are regularly maintained, will of course be among observation points selected when they are located in tobacco producing areas.

The Plant Disease Survey will cooperate in the undertaking by recording and distributing the data reported.

This suggestion appealed to the St. Louis conference so strongly that a memorandum on the subject was requested. The plan for periodic visits to selected observation points by pathologists for plant disease survey purposes seemed to meet with general approval. The utilization of branch stations for this purpose was also commended. Disease records systematically secured at appropriate stated intervals by means of visits, or by resident pathologists, season after season, and so taken as to be comparable year with year, could be correlated with

the weather records or other related environmental factors such as cropping history, soil characteristics, fertilizer treatments, and the like, usually available at such points. Such data would not only have cumulative local value but the observations from all the various stations dealing with similar problems would supplement each other. Moreover, observations taken in this systematic way would be accurately made in conformity to a pre-arranged plan.

H. A. Edson

RELATIVE PREVALENCE OF VARIOUS CORN EAR ROT FUNGI IN THE 1934 CROP

P. E. Hoppe and J. R. Holbert

The data from a survey on the relative prevalence of the various fungi associated with ear rot in corn in the 1934 crop have been summarized and are presented herein. The results of a similar survey on the 1933 crop have been published previously (Reporter 18: 186 - 189. Dec. 1, 1934) but are repeated in the present report for comparison.

The surveys are made possible through the active cooperation of many representatives of the Federal Grain Supervision Service, Bureau of Agricultural Economics, U. S. Department of Agriculture, located in leading markets throughout the United States. The methods employed in the survey briefly are as follows: Samples from carlond lots of known origin, in which the quantity of damaged corn was an important factor in determining the numerical market grade, are sent into the Chicago office from the important terminal markets. These samples, including both sound and damaged separates, after being reviewed in Chicago, are mailed to J. R. Holbert, Bloomington, Ill., who examines the sound separates for general quality and evidence of immaturity. The samples then are turned over to P. E. Hoppe at Madison, Wis., who plates the damaged kernels and identifies the fungi present in the damaged separates.

Incidence of the Various Rot Fungi in Samples from the 1934 Crop

The scope of the suvey obviously is limited to those sections of the corn belt from which corn is being shipped to the terminal markets. The crop failure in southern Iowa, Kansas, Nebraska, and Missouri in 1934, due to the drought, resulted in very few samples being obtained from these important corn producing areas. Other sections of the corn belt were fairly well represented. A total of 463 carlot samples were obtained from the 1934 crop shipments in contrast with 155 for 1933, the first year of the survey. The increase in numbers was due partly to a better general organization for the survey in 1934, and partly due to the unusually large amount of ear rot in the 1934 crop.

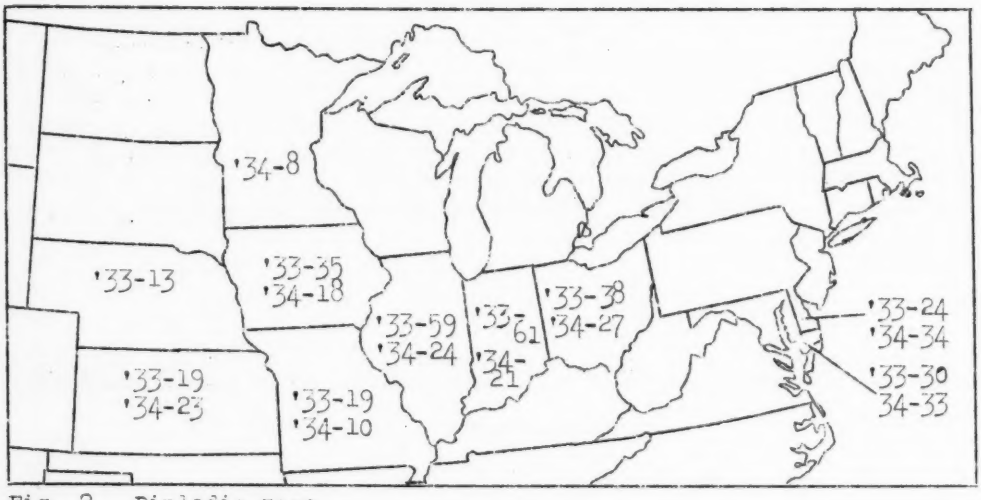

Fig. 2. Diplodia zone

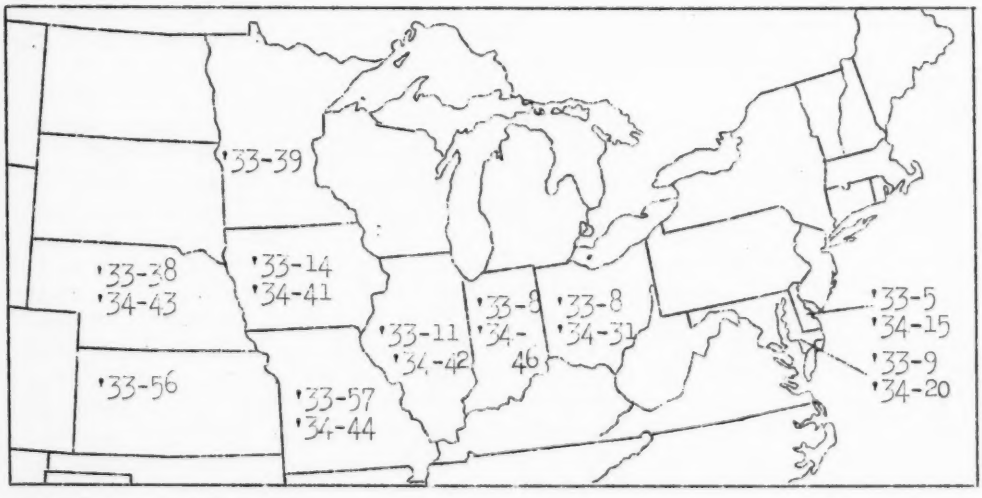

Fig. 3. Fusarium spp.

Figures 2 and 3. Relative prevalence of various fungi in carload lots of corn of the 1933 and 1934 crops which reached the terminal markets from the States indicated and in which the quantity of damaged kernels was a factor in determining market grade. Each figure shows the percentage of the cultured kernels from the damaged separates which were rotted by the fungus mentioned. The number of carlots examined for 1933 and 1934, respectively, was as follows: Kansas 4, 0, Nebraska 5, 15, Missouri 3, 4, Minnesota 0, 37, Iowa 14, 135, Illinois, 65, 155, Indiana 19, 66, Ohio 29, 31, Delaware 4, 5, Maryland 23, 46.

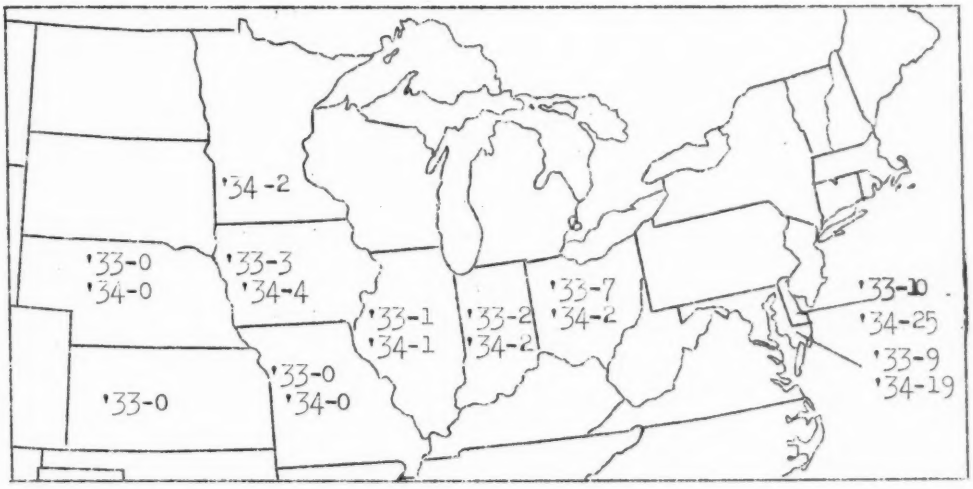

Fig. 4. Gibberella saubinetii

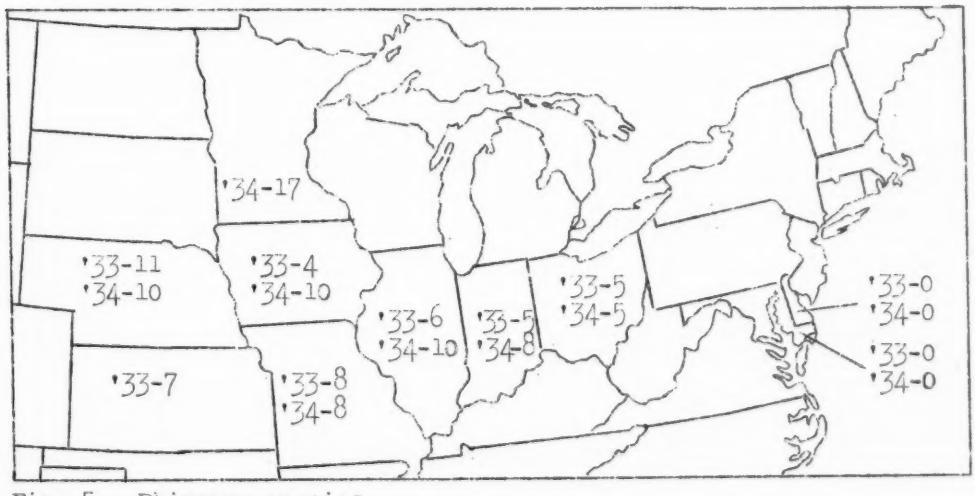

Fig. 5. Rhizopus species

Figures 4 and 5. Relative prevalence of various fungi in carload lots of corn of the 1933 and 1934 crops which reached the terminal markets from the states indicated and in which the quantity of damaged kernels was a factor in determining market grade. Each figure shows the percentage of the cultured kernels from the damaged separates which were rotted by the fungus mentioned. The number of carlots examined for 1933 and 1934, respectively, was as follows: Kansas 4, 0, Nebraska 5, 15, Missouri 3, 4, Minnesota 0, 37, Iowa 14, 135, Illinois, 65, 155, Indiana, 19, 66, Ohio 29, 31, Delaware 4, 5, Maryland 23, 46.

The data, summarized for States, for the percentages of kernels in the damaged separates showing rotting with Diplodia zeae, Fusarium species, Gibberella saubinetii, and Rhizopus species in both the 1933 and 1934 samples are presented in figures 2, 3, 4, and 5.

The data for the 1934 crop show sharp decreases in the percentage of kernels rotted by Diplodia in the samples from Iowa, Illinois, Indiana, and Ohio when compared with the results obtained on the 1933 crop (fig. 2). The drop in Diplodia is mostly compensated for with an increase in Fusarium which showed proportionate increases in the averages for the States mentioned (fig. 3). The drop in Diplodia was less pronounced in Ohio, while in Delaware and Maryland the percentages for Diplodia showed slight increases over those for 1933. The decreases in percentage of Diplodia rot are not interpreted as indicating less damage from Diplodia in 1934 but rather as increases for Fusarium. Fusarium commonly develops around wounds in ears of corn, so it would be expected that the epidemic of corn ear worm in 1934 should result in an unusual amount of Fusarium damage that season.

For the second successive season Gibberella platings ran high in Delaware and Maryland samples but again were low in samples originating from the main corn belt region (fig. 4). Between 20 and 25 per cent of all damaged kernels from the seaboard States plated pure cultures of Gibberella in contrast with figures ranging from 0 to less than 4 per cent for samples originating in the mid-west Corn Belt States.

The distribution of Rhizopus as an ear and kernel rot fungus was marked by its complete absence in the Delaware and Maryland samples both in 1933 and 1934 (fig. 5). In the corn belt proper, Rhizopus ranged from 8 per cent in Indiana and Missouri samples to 17 per cent in those from Minnesota.

Although the terminal market method of survey has been conducted only two years, evidence is accumulating which indicates a reliability of results obtained by this method of determining the extent and distribution of the various ear-rot fungi. The consistency with which definite groups of fungi have appeared in the platings of samples from given regions indicates that differences noted in the results from the various States are not due to chance. Furthermore, the data, when tabulated and mapped for counties, have shown a gradual transition of these interregional changes. The platings from certain regions have been so consistent, with regard to the fungi present, that the source of origin of the samples could often be surmised even from a casual observation of the plates. Additional evidence of the efficiency of this method of survey was obtained in 1934 when the results of the platings from yield trial plots in four

widely separated counties in Illinois were compared with the data from terminal market samples originating in the same counties. The results show identical rankings of the counties, for percentage Diplodia, from both sets of platings. (Division of Cereal Crops and Diseases)

SPHAEROPSIS MALORUM ON ABIES CONCOLOR

Marvin E. Fowler

Specimens of Abies concolor L. & G. were sent to the Division of Forest Pathology late in the fall of 1934 from Silver Spring, Maryland, with a request that the cause of the dying condition of the tree be determined. A fungus agreeing with the description of Sphaeropsis malorum Pk. and verified by N. E. Stevens as being identical with the species referred to by that name in his paper on apple black rot fungi[1] was found to be fruiting abundantly on the dead and dying needles.

In the hope of obtaining additional information regarding this fungus, apples were inoculated with single-conidium cultures of it, and as a check, with single-conidium cultures of a larger spored species of Sphaeropsis isolated from Austrian pine from Annapolis, Maryland. (The spore measurements of this fungus agree with those of S. ellisii Sacc., ranging from 29 to 39 by 13 to 17u; those from the fir fungus are 20 to 28 by 9 to 14u.) Also as checks, apples were punctured with a sterile needle into some of which wounds sterile potato-dextrose agar was inserted. Both fungi produced an apple rot that Dr. Charles Brooks of the Division of Fruit and Vegetable Crops and Diseases considered typical of black rot. The rot caused by the pine Sphaeropsis spread more slowly than that caused by the one from fir and a smaller proportion of the inoculations resulted in rot. The punctures alone and with sterile agar did not produce rot. Each organism was recovered from the edge of the rot that it produced. In the paper cited Stevens stated that the fungus referred by him to Diplodia mutila Fries (Sphaeropsis malorum Berk.) also produces a black rot of apple. Fenner [2] found that a similar rot of apple was produced by Botryosphaeria ribis Gross. & Dug. and its form B. ribis chromogena.

In the literature no report of Sphaeropsis malorum on fir trees could be found, but it has been reported on other conifers. Other species of Sphaeropsis have, in a few instances, been reported on Abies spp.

1/ Stevens, Neil E. Two apple black rot fungi in the United States. Mycologia 25:536-548. 1933.

2/ Fenner, E. Aline. A rot of apples caused by Botryosphaeria ribis. Phytopath. 15: 230-234. 1925.

An examination of the affected fir tree revealed, in addition to the above-mentioned fungus, several factors which might account for its weakened condition. When the tree was transplanted during the spring of 1933, it had been planted at least three inches too deep and its roots had been severely pruned. Also about four pounds of commercial fertilizer (4-8-4) had been applied on the ground next to the trunk and worked into the soil around its roots. (Division of Forest Pathology).

FUSARIUM ON GLADIOLUS

Lucia McCulloch

A corm rot and wilt disease caused by Fusarium spp. which infect primarily the vascular tissues of the gladiolus has been a subject of more or less study since 1922. A brief mention of this disease appears on p. 82 of The Gladiolus, 1936, published by The New England Gladiolus Society. This disease, which is unlike that caused by F. oxysporum var. gladioli, is well known to gladiolus growers but the above note is probably the first printed record. (Division of Fruit and Vegetable Crops and Diseases).

CHLOROSIS OF POINSETTIA IN WASHINGTON

F. P. McWhorter

A chlorosis of greenhouse-grown poinsettias was called to our attention by Inspector Henry Reynolds of Washington State. I have recently made a rather extensive survey of the situation in the Spokane region, where at the present time the trouble occurs in most of the houses. The variety, Mrs. Paul Eche, is particularly susceptible. From this first examination it seems that the trouble is of the chlorosis group rather than of the virus group. In support of the chlorosis theory, I should mention that the fall season in Spokane has been unusually cloudy and foggy, and the greenhouses have not received the normal amount of sunlight. We recommended trials of various color-correcting treatments, such as the use of zinc sulfate, and iron and magnesium compounds. The results are not evident yet. (Division of Fruit and Vegetable Crops and Diseases).

PHONY PEACH DISEASE CONTROL

Lee A. Strong

/From: Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1935 (for fiscal year ended June 30, 1935), pp. 5-6/7

The phony peach disease, a virus disease intercommunicable among peach, plum, apricot, almond, and several other species, is known to have existed in peach plantings in Georgia for more than 50 years. It was not, however, until about 1920 that serious economic damage occurred. The disease is now recognized as a potential menace to the commercial growing of peaches in this country. The limited amount of scouting from 1926 to 1934 showed that the disease had spread to other States, and it is now known to be wide-spread throughout Georgia, Alabama, Mississippi, Louisiana, eastern Texas, and northern Florida, and scattered in South Carolina, Tennessee, and Arkansas. A few cases have been found in North Carolina, Missouri, and Illinois, and in 1932 one phony tree was found in southern Oklahoma. Since 1929 this Bureau has undertaken the prevention of the spread of the phony peach disease through the movement of nursery stock from infected nurseries. The closely coordinated eradication project that had been carried on by the Bureau of Plant Industry since 1929 was transferred to the Bureau of Entomology in December 1933, and both activities were consolidated the following year into a unified project with field headquarters at the Department's Peach Disease Laboratory, Fort Valley, Ga.

During the period from 1929 to the fiscal year 1935, inclusive, 589,290 trees in commercial and home orchards in 13 States were found infected and destroyed, in addition to eradications under the Civil Works Administration and nursery-inspection work. All the evidence obtained during this period indicates that economic control is practicable under the method employed.

The eradication work in orchards during the fiscal year 1935 is given in table 5.

The data in table 5 show that in commercial orchards 1.69 per cent of the trees inspected were found to be infected with the phony peach disease and that in the home orchards 2.47 per cent were so infected.

A new plan of action was put into effect at the beginning of the 1935 field season for the purpose of obtaining definite information as to the extent of inspection and the scope of the control problem. For this purpose, four specific lines of activity were determined upon: (1) In the Gulf area where infection is prevalent to the extreme western limitation of peach production, nursery-

Table 5. Commercial orchards and home properties inspected by Federal and State inspectors in cooperation to determine the presence or absence of phony peach disease, fiscal year 1935.

State	Commercial orchards				Home orchards and escaped trees				Total phony trees
	Properties		Trees		Properties		Trees		
	Inspected	Phony	Inspected	Phony	Inspected	Phony	Inspected	Phony	
	Number	Number	Number	Number	Number	Number	Number	Number	Number
Georgia	945	615	5,017,209	96,954	1,627	533	46,491	2,014	98,968
Alabama	3	2	1,300	2	299	24	9,937	68	70
Arkansas	78	17	371,705	27	6	0	100	0	27
Delaware	51	0	154,305	0	250	0	1,545	0	0
Louisiana	76	51	63,652	2,183	5,210	285	47,265	1,162	3,345
Mississippi	25	9	28,293	395	540	25	4,975	49	444
North Carolina	22	1	80,292	5	1,212	19	11,586	24	29
South Carolina	18	1	38,425	2	133	0	3,233	0	2
Tennessee	32	1	113,525	1	972	10	9,776	25	26
Texas	14	7	23,857	20	25	3	452	6	26
Total	1,264	704	5,892,563	99,589	10,274	899	135,360	3,348	102,937

environs inspection is receiving first consideration as a preventive measure against long-distance spread; (2) inspection and eradication of diseased trees in orchards in this area is also undertaken, the commercial areas receiving principal attention; (3) in the lightly infected States of North Carolina, South Carolina, Tennessee, Arkansas, Oklahoma, Missouri, and Illinois, it is the aim to eradicate all known infected trees, thus preventing, if possible, the northward spread of the disease into new areas; (4) a general survey of peach-growing areas of Delaware, New Jersey, Maryland, Virginia, West Virginia, Kentucky, Ohio, and Indiana is under way to find and destroy any scattered infections that might be present in this region not heretofore known to be infected. This survey will also include those parts of the lightly infected States not now known to be infected with phony peach disease.

CITRUS CANKER ERADICATION

Lee A. Strong

/From: Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1935 (for fiscal year ended June 30, 1935), pp. 6-7

The citrus canker eradication campaign is unique in character in that it is the first instance of the use of Federal funds appropriated specifically for the eradication of a plant disease. Despite the skepticism of many specialists who, at the time the work was inaugurated 20 years ago, regarded the effort as foredoomed to failure, the citrus industry has been protected from the ravages of this destructive disease. The effectiveness of this campaign is definitely proved by the fact that although canker was found on 515 properties in Florida, scattered through 26 counties, and approximately 3,000,000 citrus trees were destroyed because of the disease, no citrus canker has been reported since 1927 in this extremely important citrus-producing State.

During the years from 1915 to June 30, 1933, citrus canker eradication activities were maintained cooperatively with the States of Florida, Alabama, Louisiana, Mississippi, and Texas, and Federal supervision was delegated to the Bureau of Plant Industry until December 1, 1933, when it was transferred to the Bureau of Entomology. During 1934 cooperative inspection work was limited to Louisiana and Texas in areas where incipient infections were known to persist.

In the fiscal year 1935 the project was reorganized and a Bureau representative assigned to direct activities in the field in cooperation with the State officers. Such field contact gave impetus to the work from the start. A methodical drive was centered in the Galveston area of Texas to search for infection in wild or abandoned trees in wooded bayous, along roadsides, or in nurseries or home

plantings. Due to infections developing in relatively young plantings in this area from time to time it was obvious that somewhere in the vicinity lingered undiscovered infected trees and the task was to find and destroy them. From the beginning of the drive in January 1935 to the close of the fiscal year from 2 to 4 inspectors working this area found citrus canker on 31 properties. All infected trees, totaling 606, and exposed trees, totaling 5,728, were destroyed under State authority. All citrus trees located in the day's work were plotted on a map for use in the event of the approval of more extensive eradication under an emergency relief project. Limited scouting during the year failed to disclose any infection in the commercial area of the lower Rio Grande Valley or the citrus-growing areas of Mississippi and Alabama. In Louisiana citrus canker was found in three parishes during the summer of 1934. The 14 infected trees and 32 other exposed trees were destroyed and, although grove and fruit inspection has been continued in the intervening months, no further infection has been discovered in that State. There were 218,904 trees inspected in Louisiana from July to December 1934. In Texas the inspection of 829,775 trees in 16 counties during the first half of the fiscal year disclosed 20 infected trees on 2 properties in the Galveston area. These were destroyed.

An extremely important and encouraging factor in the campaign is the recent approval of an emergency relief project to destroy abandoned and escaped citrus trees throughout the citrus-producing areas of Louisiana and Texas.

There is every reason to believe that continued systematic scouting in the citrus-producing areas of Texas and other States will ultimately result in complete eradication of citrus canker from the United States.

It will be noted that the figures in table 6 cover only the 6-month period beginning January 1, 1935. The few infected nurseries found in this work consisted chiefly of abandoned plantings, which were destroyed, and there were no indications that infected stock had been shipped from such nurseries.

Table 6. Citrus canker inspections, January 1 to June 30, 1935.

State	Counties or parishes inspected	Properties		Trees inspected			Trees	
		Inspected	Infected	Grove and dooryard	Abandoned	Nursery stock	Infected	Destroyed
	Number	Number	Number	Number	Number	Number	Number	Number
Alabama	2	301	0	13,698	66,482	60,672	0	114,800
Louisiana	3	543	0	294,632	0	17,850	0	0
Mississippi	6	952	0	23,987	95,239	13,053	0	0
Texas	9	4,165	31	35,993	126,629	1,136,999	606	6,334
Total	20	5,961	31	368,310	288,350	1,228,574	606	121,134